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| EXAMINER | |
|---|---|
| LE, TOAN M | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2863 | |

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/809,285 | ZADOR ET AL. | |
| | **Examiner** | **Art Unit** | |
| | Toan M. Le | 2863 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 24 March 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-53 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-53 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 March 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4/28/05.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-53 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The method/system claims do not produce a tangible result. It is unclear how the result is being stored, displayed, or used in any tangible manner. In order to overcome the rejection, claim language should be added that includes displaying, storing or conveying used in tangible results. To view the new guidelines for 35 U.S.C. 101 please view the following OG notice.

http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-6, 8-21, 23-35, 38-45, 48-49, 51, and 53 are rejected under 35 U.S.C. 102(a) as being anticipated by "A Maximum Likelihood Approach to Single-Channel Source Separation", Jang et al. (referred hereafter Jang et al.).

Referring to claim 1, Jang et al. disclose a method for performing source separation (Abstract), comprising:

receiving a composite signal of a plurality of sources, each source characterized by at least one filtered basis function and at least one coefficient (figure 1; pages 1367-1369, 2.1 A Model for Signal Representation section);

providing a post-filter signal dictionary that includes a set of filtered basis functions, wherein at least a portion of the filtered basis functions that form part of each source is included in the dictionary (pages 1367-1369, 2.1 A Model for Signal Representation section; pages 1371-1373, 3.1 Formulation of Separation Algorithm section); and

estimating the value of the at least one coefficient of each source using the composite signal and the dictionary (pages 1373-1376, 3.2 Deriving Adaptation Formulas section); and

selectively reconstructing at least one source using the estimated value of the at least one coefficient (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 2, Jang et al. disclose a method for performing source separation (Abstract) further comprising:

providing a pre-filter signal dictionary that includes a set of basis functions;

providing at least one directional filter; and

generating the post-filter signal dictionary by convolving the at least one directional filter to each basis function in the pre-filter signal dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 3, Jang et al. disclose a method for performing source separation (Abstract), wherein the basis functions are selected according to predetermined criteria (page 1384, last paragraph to page 1385, 1st paragraph).

As to claim 4, Jang et al. disclose a method for performing source separation (Abstract), wherein each basis function represents a signal originating substantially directly from a source (page 1384, last paragraph to page 1385, 1st paragraph).

Referring to claim 5, Jang et al. disclose a method for performing source separation (Abstract), wherein the at least one directional filter characterizes a basis function as if it originated from a source located in a particular location (page 1384, last paragraph to page 1385, 1st paragraph).

As to claim 6, Jang et al. disclose a method for performing source separation (Abstract), wherein each filtered basis function represents a signal originating from a source located in a particular location (page 1384, last paragraph to page 1385, 1st paragraph).

Referring to claim 8, Jang et al. disclose a method for performing source separation (Abstract) further comprising using a sensor to receive the composite signal (figures 4-5; page 1369, 2.2 Learning Basis Function section).

Referring to claim 9, Jang et al. disclose a method for performing source separation (Abstract) further comprising using a plurality of sensors to receive the composite signal (figures 4-5; page 1369, 2.2 Learning Basis Function section).

As to claim 10, Jang et al. disclose a method for performing source separation (Abstract), wherein the step of estimating further comprises:

generating a plurality of solutions for a given one of the coefficients;

determining which one of said plurality of solutions corresponds to a most sparse solution; and

assigning the most sparse solution to the given one of the coefficients (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 11, Jang et al. disclose a method for performing source separation (Abstract), wherein the step of estimating comprises:

generating a plurality of solutions for a given one of the coefficients;

determining which one of said plurality of solutions mostly closely satisfies predetermined criteria, said predetermined criteria including noise criteria; and

assigning the solution that most closely satisfied said predetermined criteria to the given one of the coefficients (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 12, Jang et al. disclose a method for performing source separation (Abstract), wherein the step of selectively reconstructing comprises using the estimated value of the at least one coefficient and the post-filter signal dictionary (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 13, Jang et al. disclose a method for performing source separation (Abstract), wherein step of selectively reconstructing comprises using the estimated value of the at least one coefficient and a pre-filter signal dictionary used to generate the post-filter signal

dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 14, Jang et al. disclose a method for performing source separation (Abstract), wherein the composite signal is a signal selected from the group consisting of an acoustic signal, an electromagnetic signal, a radio signal, an ultrasonic signal, a light signal, or an electrical signal (figures 6, 8-9, and 11-12; page 1367, 2. Adapting Basis Functions and Model Parameters section).

Referring to claim 15, Jang et al. disclose a system for performing source separation (Abstract), comprising:

a sensor for receiving a composite signal of a plurality of sources, each source characterized by at least one filtered basis function and at least one coefficient (pages 1367-1369, 2.1 A Model for Signal Representation section; pages 1369-1370, 2.2 learning Basis Function section); figures 4-5); and

a programmable processor electrically coupled to the sensor, the processor is operative to access a post-filter signal dictionary that includes a set of filtered basis functions, wherein at least a portion of the filtered basis functions that form part of each source is included in the dictionary (pages 1367-1369, 2.1 A Model for Signal Representation section; pages 1371-1373, 3.1 Formulation of Separation Algorithm section); the processor is operative to estimate the value of the at least one coefficient of each source using the composite signal and the dictionary (pages 1373-1376, 3.2 Deriving Adaptation Formulas section), and the processor is operative to selectively reconstruct at least one source using the estimated value of the at least one

coefficient (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 16, Jang et al. disclose a system for performing source separation (Abstract) further comprising:

a storage device coupled to the processor, the storage device having stored therein a pre-filter signal dictionary that includes a set of basis functions and at least one directional filter (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 17, Jang et al. disclose a system for performing source separation (Abstract) wherein the processor is operative to generate the post-filter signal dictionary by convolving the at least one directional filter to each basis function in the pre-filter signal dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section;.pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 18, Jang et al. disclose a system for performing source separation (Abstract), wherein the basis functions are selected to satisfy predetermined criteria (page 1384, last paragraph to page 1385, 1st paragraph).

Referring to claim 19, Jang et al. disclose a system for performing source separation (Abstract), wherein each basis function represents a signal originating substantially directly from a source (page 1384, last paragraph to page 1385, 1st paragraph).

As to claim 20, Jang et al. disclose a system for performing source separation (Abstract), wherein the at least one directional filter characterizes a basis function as if it originated from a source located in a particular location (page 1384, last paragraph to page 1385, 1st paragraph).

Referring to claim 21, Jang et al. disclose a system for performing source separation (Abstract), wherein each filtered basis function represents a signal originating from a source located in a particular location (page 1384, last paragraph to page 1385, 1st paragraph).

As to claim 23, Jang et al. disclose a system for performing source separation (Abstract) further comprising at least a second sensor that is electrically coupled to the processor and that receives the composite signal (figures 4-5; page 1369, 2.2 Learning Basis Function section).

Referring to claim 24, Jang et al. disclose a system for performing source separation (Abstract), wherein the processor is operative to:

generate a plurality of solutions for a given one of the coefficients;

determine which one of said plurality of solutions corresponds to a most sparse solution; and

assign the most sparse solution to the given one of the coefficients (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 25, Jang et al. disclose a system for performing source separation (Abstract), wherein the processor is operative to selectively reconstruct at least one source using the estimated value of the least one coefficient and the post-filter signal dictionary (pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 26, Jang et al. disclose a system for performing source separation (Abstract), wherein the processor is operative to selectively reconstruct at least one source using the estimated value of the at least one coefficient and a pre-filter signal dictionary used to generate the post-filter signal dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 27, Jang et al. disclose a system for performing source separation (Abstract), wherein the composite signal is a signal selected from the group consisting of an acoustic signal, an electromagnetic signal, a radio signal, an ultrasonic signal, a light signal, or an electrical signal (figures 6, 8-9, and 11-12; page 1367, 2.0 Adapting Basis Functions and Model Parameters).

Referring to claim 28, Jang et al. disclose a method for performing source separation (Abstract), comprising:

generating a signal dictionary through application of at least one directional filter (pages 1367-1369, 2.1 A Model for Signal Representation section; pages 1371-1373, 3.1 Formulation of Separation Algorithm section);

receiving a mixture of a plurality of sources, including desired sources and undesired sources (figure 1; pages 1367-1369, 2.1 A Model for Signal Representation section); and

separating said plurality of sources using elements of said signal dictionary and said mixture as variables in a set of mathematical equations that estimate the value of unknown coefficients corresponding to each of said sources (figures 4-5; pages 1377-1378, 3.4 Iterative

Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 29, Jang et al. disclose a method for performing source separation (Abstract) further comprising: reconstructing said desired sources using the estimated value of said coefficients (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 30, Jang et al. disclose a method for performing source separation (Abstract), wherein said reconstructing comprises using the estimated value of said coefficients and said signal dictionary to reconstruct said desired sources (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 31, Jang et al. disclose a method for performing source separation (Abstract), wherein said generating comprises:

providing a pre-filter signal dictionary having a set of basis functions; and

applying said at least one directional filter to said set of basis functions to generate said signal dictionary, wherein said elements of said signal dictionary are filtered basis functions (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 32, Jang et al. disclose a method for performing source separation (Abstract), wherein said reconstructing comprises using the estimated value of said coefficients and said pre-filter signal dictionary to reconstruct said desired sources (figures 4-5; pages 1377-

1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 33, Jang et al. disclose a method for performing source separation (Abstract), wherein said at least one directional filter modifies the properties of said basis functions to approximate how said basis functions are received based on a particular location in which said basis functions originate (page 1384, last paragraph to page 1385, 1st paragraph).

Referring to claim 34, Jang et al. disclose a method for performing source separation (Abstract), wherein said receiving comprises using one sensor (figures 4-5; page 1369, 2.2 Learning Basis Function section).

As to claim 35, Jang et al. disclose a method for performing source separation (Abstract), wherein said receiving comprises using at least two sensors (figures 4-5; page 1369, 2.2 Learning Basis Function section).

Referring to claim 38, Jang et al. disclose a method for performing source separation (Abstract), wherein said undesired sources comprise noise (pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 39, Jang et al. disclose a system for performing source separation (Abstract), comprising:

a sensor for receiving a mixture of a plurality of sources, including desired sources and undesired sources (figures 4-5; page 1369, 2.2 Learning Basis Function section); and

processing circuitry coupled to said sensor and operative to:

generate a signal dictionary through application of at least one directional filter (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned

Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section); and

separate said plurality of sources using elements of said signal dictionary and said mixture as variables in a set of mathematical equations that estimate the value of unknown coefficients corresponding to each of said sources (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 40, Jang et al. disclose a system for performing source separation (Abstract), wherein said processing circuitry is operative to: reconstruct said desired sources using the estimated value of said coefficients (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 41, Jang et al. disclose a system for performing source separation (Abstract), wherein said processing circuitry is operative to reconstruct said desired sources using the estimated value of said coefficients and said signal dictionary (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 42, Jang et al. disclose a system for performing source separation (Abstract) further comprising:

a storage device coupled to said processing circuitry, said storage device comprising a pre-filter signal dictionary having a set of basis functions; and

wherein said processing circuitry is operative to apply said at least one directional filter to said set of basis functions to generate said signal dictionary, wherein said elements of said signal dictionary are filtered basis functions (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 43, Jang et al. disclose a system for performing source separation (Abstract), wherein said processing circuitry is operative to reconstruct said desired sources using the estimated value of said coefficients and said pre-filter signal dictionary (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 44, Jang et al. disclose a system for performing source separation (Abstract), wherein said at least one directional filter modifies the properties of said basis functions to approximate how said basis functions are received based on a particular location in which said basis functions originate (page 1384, last paragraph to page 1385, 1st paragraph).

As to claim 45, Jang et al. disclose a system for performing source separation (Abstract), wherein said sensor is a first sensor, said system further comprising at least a second sensor to receive said mixture (figures 4-5; page 1369, 2.2 Learning Basis Function section).

Referring to claim 48, Jang et al. disclose a system for performing source separation (Abstract), wherein said undesired sources comprise noise (pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 49, Jang et al. disclose a method for generating a signal dictionary, comprising:

providing a pre-filter signal dictionary having a plurality of basis functions;

providing at least one directional filter; and

generating a post-filter signal dictionary having a plurality of filtered basis function that are created by applying said at least one directional filter to each basis function in said pre-filter signal dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

Referring to claim 51, Jang et al. disclose a system comprising processing equipment for generating a signal dictionary, said processing equipment configured to:

store in a storage device at least one directional filter and a pre-filter signal dictionary having a plurality of basis functions; and

generate a post-filter signal dictionary having a plurality of filtered basis function that are created by applying said at least one directional filter to each basis function in said pre-filter signal dictionary (pages 1371-1373, 3.1 Formulation of Separation Algorithm section; pages 1381-1382, 4.2 Learned Basis Filters section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

As to claim 53, Jang et al. disclose a system comprising processing equipment for generating a signal dictionary, wherein said processing equipment is operative to use said post-filter signal dictionary to perform source separation (figures 4-5; pages 1377-1378, 3.4 Iterative Source Separation Algorithm and Time Complexity Analysis section; pages 1382-1385, 4.3 Separation Results of Simulated Mixtures section).

***Allowable Subject Matter***

Claims 7, 22, 36-37, 46-47, 50, and 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The reason for allowance of the claims 7, 22, 37, 47, 50, and 52 is the inclusion of directional filter is a head-related transfer function.

The reason for allowance of the claims 36 and 46 is the inclusion of mathematical equations that apply an L1 norm optimization condition to estimate the value of the coefficients.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

"A Subspace Approach to Single Channel Signal Separation Using Maximum Likelihood Weighting Filters", Jang et al., 2003 IEEE, pages 45-48

"Adaptive Blind Separation of Convolutive Mixtures", Delfosse et al., 1996 IEEE, Pages 341-345

"Time Domain Blind Source Separation of Non-Stationary Convolved Signals by Utilizing Geometric Beamforming", Aichmer et al., 2002 IEEE, Pages 445-454

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toan M. Le whose telephone number is (571) 272-2276. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Toan Le

August 26, 2006

BRYAN BUI
PRIMARY EXAMINER